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THE SOCIAL LEGITIMATION OF BIOMEDICAL TECHNOLOGIES IN RUSSIA: COMMUNICATION CHALLENGES FOR SCIENCE AND SOCIETY

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THE SOCIAL LEGITIMATION OF BIOMEDICAL TECHNOLOGIES IN RUSSIA: COMMUNICATION CHALLENGES FOR SCIENCE AND SOCIETY

Throughout history the development of medical institution was followed by the extension of medical expertise boundaries. Progress in new medical biotechnologies and the manipulation of human biological material, in particular, raise the conceptual question of how to define the boundaries between human beings and biological material. This paper focuses on the analysis of attitudes towards research on the human body, in scientific, political and cultural discourse. In public discussions about stem cell technology we found that the extension of medical expertise boundaries caused an intervention of ethical expertise in the fields of science and medicine. Nevertheless, the cultural conflict does not become an obstacle to the recognition of stem cell research and its legitimation in the collective consciousness.

Keywords: stem cells, bioethics, public opinion, bans on scientific research, discourse.

JEL classification: I10, I11, I18, O33, O38.

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Introduction

Medical institution and medical technologies has always been expansive. Since the 19th century, medical expertise reached areas which it had not been previously in its jurisdiction, and forms of deviant behavior were described as pathologies and deviations from the normal healthy state of a human body (Conrad, 1992). For instance, alcoholism was considered a pathological processes that could be controlled with medical treatment (Zola, 1972; Shneider, 1978). With the development of medical institution and medical knowledge there was a redefinition of insanity as a mental disorder that could be medically examined and treated (Foucault 1997, 2004).[2] In 1972 Irving Zola introduced the term "medicalization" to define this process (Zola, 1972). The further development of medical technologies changed the focus from tracing the state of a body to its transformation and control over its identity (e.g., the emergence of genetic passports). As a result it is possible to speak not only about medicalization, but about social biomedicalization. (Clark et al., 2003).

There is an ethical challenge or even a cultural conflict between medical ideology and social moral norms caused by developments, for example the embryonic stem cells research, the usage of human fetal tissues (aborted fetus), and cloning. The approval of such practices has a number of social risks associated with violations of human rights and questions about the motivations of physicians. Conventionally this biomedical technology is described as socially sensitive.

The conjugation of these health[3] and social risks became the impetus for internal and external reflection on the impact of these innovations, it also pushed the development of the bioethics paradigm, which calls for humanistic science in general and in medicine in particular. An extensive analysis of the discussions on the development of bioethics is provided in Siluyanova (2001), Ivanyushkin (2004) and Evans (2011). As a part of this debate, there is controversy concerning social values. For instance, can we consider a two day old embryo a human being, if it was created using in vitro fertilization? Should we ban the use of embryonic stem cells to fight incurable diseases for moral reasons?

Media discussions on the social, ethical and legal implications of medical biotechnology play an important role in its social legitimation. Such topics traditionally attract the attention of different audiences. For example, 84% of Russian population are interested in medical R&D achievements, and 66% of Russians have an interest in general scientific discoveries (S&T Indicators: 2011, p. 314). Moreover, medicine (as well as science in general) is a popular cultural topic in contemporary Russian media as a part of world science news, included in the daily media content. The media are used to attract audiences, and to create controversy for scientific discussion. In the absence of a dominant interpretation, everyone has to form their own opinion by choosing the most appropriate method of reasoning. This affects the discussion outcomes and has a further influence on politics. The media contribute to the mutual adaptation of technologies and social values (Weingart et al., 2008, p. 381). Meanwhile the problematisation of socially sensitive technology and the media appeal to moral values contribute to the stigmatization of technology and also prevents its acceptance in the society. The important role of the media in the

[2] The author does not consider the expansion of medical discourse solely as an extension of specific social institutions of power. The medicalization took place in the context of the profound social transformations related to the changes in the regulatory framework and the institutional organization of social order in general. However, this topic goes beyond the aims of the paper.

[3] In this case, under the health risks we mean the risks associated with the technology impact of on the patient. Any medical technology should be tested in pre-clinical and clinical trials to prove its safety and effectiveness.

process of social legitimation encouraged researchers to analyse the media coverage of various biotechnologies (e.g. Nisbet & Lewenstein 2002; Holliman 2004; Bauer 2007; Weingart et al. 2008; Kim 2013). The results reveal similar trends of media discussions, for instance, of supportive and critical discourses (e.g., Nisbet and Lewenstein, 2002, p.384). Public opinion polls about socially sensitive biotechnologies demonstrate the same ambivalence (see, for instance: Kleinman & Kloppenburg, 1991, Nisbet & Goidel, 2007; Critchley, 2008; Liu & Priest, 2009).

Research of socially sensitive medical biotechnology has been undertaken, however, the results are mostly focused on the analyses of the specific issues of the social legitimation of technology.

This article is an analysis of the integration process, for example, how the discourse of socially sensitive medical biotechnologies is incorporated into the collective idea of modern and future medicine. It compares the discourse development in different social fields and determines whether or not a social legitimation of socially sensitive medical biotechnologies is happening in the context of the cultural conflict between medicine and systems of social values.

To study these processes we have chosen stem cell technology in Russia. This technology is chosen for several reasons. First, the stem cell technology combines both health and social risks. Second, the subject is not a complete taboo. Third, the topic is extremely popular in the Russian media, so awareness of it is significant across social groups, which will be demonstrated below. The article includes three parts. First, it describes the social context of stem cell discourse in media and identifies the key elements of the public discourse about stem cells. Second, there is an analysis of social attitudes and their dynamics regarding appropriate biotechnology. Finally, there are conclusions about the legitimation of socially sensitive medical biotechnologies in the public consciousness.

Methodology and Approach

Our analysis is case-study based (Dooley, 2002; Walsh et al., 2004). We use three methods of data collection:

1. Qualitative and quantitative media analysis to describe popular discourse about stem cell research in Russia.
2. Documentary evidence, in the form of legislation and patents, was examined to establish a general framework determining the development stem cell technologies and their legitimation in Russian medicine.
3. The analysis of existing surveys to study the distribution of information about stem cell research among population and social attitudes to the most controversial stem cell technologies.

We start with a description of the ethical problems associated with particular sources of stem cells. Then we turn to the analysis of the formation of the stem cell therapy industry and the institutional and legal problems connected with it in Russia. It is necessary to define the cultural specifics of stem cells industry. We pay attention to the evolving nature of media coverage. After general education, the mass media are second most important source of scientific information (Petersen, 2001; Bauer, 2005). The mass media shape public opinion about stem cells and set up the agenda for public debates.

Our media analysis is conducted with the use of the online library of Russian-language Media "Public.Ru" in two stages. First, we study overall media attention to stem cells from various sources (television, radio, newspapers, Internet), by keywords "stem cells". This stage involves the analysis of various types of data collected between 1996 and 2012. Second, we focus on the negative treatment in the media which frames public opinion. At this stage, we analyze only messages on television as this is the main source of information. We use special keywords for the selection of messages with negative connotations in the online library. The range of keywords is based on the analysis of main social, legal and other problems of the stem cells industry in Russia.

An analysis of the social context will be the base for analysis of public opinion about stem cells and a lay understanding of the challenges to cultural values posed by stem cell technologies. In exploring social attitudes to stem cells, we are limited by the availability of data and by research resources. The data for our study come from several Russia representative polls conducted by the Public Opinion Foundation (2008, 1500 respondents aged 18 years and older), Levada Center for the surveys of ISSEK HSE (2003, 2412 respondents aged 16 years and older; 2006 2100 respondents aged 16 years and older; 2008, 1597 respondents aged 18 years and older; 2009, 1600 respondents aged 16 years and older; 2010, 1611 respondents aged 18 years and older; 2011, 1763 respondents aged 16 years and older) and Levada Center for the initiative survey (2012, 1601 respondents aged 18 years and older), WCIOM (2012, 1600 respondents aged 18 years and older). Respondents were interviewed at home.

The comparison of public discourse, the development of a legal framework and public opinion are necessary to identify general trends in the social legitimation of stem cells as an example of socially sensitive medical technology.

The analysis of the social career of stem cells

For the purpose of this paper we consider stem cells as "undifferentiated cellular elements with abilities of self-regeneration and differentiation".[4] Because of the ability of stem cells to develop into specialised cells, scientists and physicians have high expectations for their use in medicine. The types of stem cells vary, and higher ductility allows the wider range of possible applications. Thus various types of stem cells are not researched at the same level. Stem cells have different sources which are associated with ethical constraints, such as the inner cell mass of a blastocyst (embryo at 4-7th day of development), abortion material, the umbilical cord blood, bone marrow, adipose tissue[5]. The prenatal sources of human stem cells (e.g., blastocyst embryo stage and abortive material) are questioned in terms of moral values.

However, the prenatal stem cells gained from these sources have a larger differential potential than postnatal stem cells. So the prenatal stem cells have a broader practical usage in medicine. To clarify this question let us use the cells classification based on the potential differentiation. According to different references there are 3-5 groups of human stem cells (high to low

[4] Types of stem-cells (Vidy stvolovyh kletok) // Source: cord blood bank «Trans-Technologies» // URL from 13.09.2013 < http://www.trans-t.ru/stem-cells/vidi.php >
[5] Types of stem-cells (Vidy stvolovyh kletok) // Source: cord blood bank «Trans-Technologies» // URL from 13.09.2013 < http://www.trans-t.ru/stem-cells/vidi.php >

potential): totipotent, pluripotent, and other types (multipotent, oligopotent and unipotent).[6] In this classification, the pluripotent stem cells have the highest medical potential. This type of stem cell is capable of differentiating into all cell types of the body, but it can not create a whole organism. The pluripotent type includes embryonic stem cells derived from blastocysts intracellular mass (obtained from in vitro embryo between the 4th and 7th days of development), it also includes stem cells formed in the later stages: the primary embryonic germ cells (gonocytes) and the cells of embryonic tumors[7]. Apart from human embryo, pluripotent cells can be derived artificially from adult body tissues[8]. These are called induced pluripotent stem cells. However, the method of producing these cells was only invented in 2006, whereas the embryonic stem cells were first extracted in 1981. At this point the scientific world of has not abandoned the embryonic stem cells (as well as fetal stem cells), so the moral dilemmas of their usage remains.

In the discourse conducted in the context of the ethical debates about the embryo's moral and legal status, there are two points of view. First states that a five-day old embryo is biological material that can be used in research. As an example of this view, in an interview with a PhD biotechnological researcher at the Laboratory of Genetic Basis Cellular Technology, Institute of General Genetics, Russian Academy of Sciences, the respondent says: "A five-day old embryo (blastocyst) contains a few hundreds cells which are not separated by a nervous system or any other system. And as we already know from practice, these mainstream cells can turn into anything. However, it may not be possible, because no one knows if this particular embryo will develop or not."[9]

The second point of view considers human life to begin with fertilization, stressing the moral status of the embryo, not its biological status (Siluyanova, 2009). The ambivalence of embryonic stem cell usage is analyzed by Yudin as an example of boundaries in the new technological world: "Let's say that to get these cells, we must use nascent human life. Or another ethical problem (not technical as the technical solution is obvious.) Is it possible to create human embryos for research purposes?" (Yudin, 2011, p. 12).

If the first view is based on scientific evidence, which is well-known among professionals, then the second post appeals to morality, which does not require special education and appeals to individual feelings. This asymmetry is the basis for action against the usage of embryonic and fetal stem cells. The best example of this is the opposition of the religious communities[10]. Within the scientific community there is also a split between supporters and opponents of the use of

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[6] The classification is based on the following sources:
Stem Cell Classification // Source: «Brown University Biology and Medicine» URL from 13.09.2013 http://biomed.brown.edu/Courses/BI108/BI108_2002_Groups/pancstems/stemcell/stemcellsclassversatility.htm
Tipy stvolovyh kletok i ih svojstva // Source: popular science website: the fond «Eternal Youth» URL from 13.09.2013 http://www.vechnayamolodost.ru/pages_34/stvolovyekletki/tiskiis.html
Potentnost // Source: cord blood bank «Trans-Technologies» // URL from 13.09.2013 http://www.trans-t.ru/help/potentnost.php
Vydelenie linij pervichnyh polovyh kletok. Proliferacija pervichnyh polovyh kletok //
Source: medical info website Medicalplanet URL from 13.09.2013 http://medicalplanet.su/Patfiz/645.html

[7] Murnaghan I. Pluripotent Stem Cells // Source: the ExploreStemCells website. URL from 20.08.2013 <http://www.explorestemcells.co.uk/pluripotentstemcells.html>

[8] Inducirovannye stvolovye kletki vyshli na klinicheskij uroven // Source: medical info website «Mednovosti» URL from 27.02.2013 http://medportal.ru/mednovosti/news/2013/02/27/ipscpreclinicaltrialjapan/

[9] Shutova M. 7 faktov ob unikalnom tipe pljuripotentnyh kletok mlekopitajushhih // Popular science website PostNauka URL from 21.02.2013 <http://postnauka.ru/faq/9413>

[10] Shkilenok M. Cerkov ne vystupaet kategoricheski protiv reproduktivnyh tehnologij, no trebuet otvetstvennogo podhoda // Source: info website «tut.by» URL from 26.09.2011 <http://news.tut.by/society/251621.html >

prenatal sources. An example of this is the American scientists protest against the funding of research on embryonic stem cells[11].

The absence of a unified point of view on embryonic (as well as fetal) stem cell research is obvious in the politics of different countries. For example, in UK there is a fetal tissue bank and approved research on embryonic stem cells derived in vitro. In Lithuania, any work with embryonic stem cells is prohibited. In Austria it is prohibited to use embryos for the cell line production, but it is permitted to import the cell lines derived from human embryos, i.e. there is no actual ban on embryonic stem cell research[12]. Thus, the legislative differences of stem cell biotechnology show another conflict between morality and the law.

Russian research practice and the formation of the stem cell therapy industry began in a legal vacuum. Let us focus on the actual legislative framework that is in place. There is legislation on human organ and tissue transplantation and their pharmaceutical usage. The actual legislation describes stem cells as tissue transplants.

The transplantation of human organs and tissues is regulated by the RF Law № 4180-1 “On the transplantation of human organs and (or) tissues" (issued on Dec 22 1992 and edited on Jun 20, 2000). However, according to the 2nd article, the Law does not apply to organs and tissues related to the human reproduction process, including reproductive tissues, as well as blood and its components. Therefore, this law does not regulate the stem cells derived from embryonic, abortion, umbilical cord, or placenta material. On July 25, 2003 the Russian Ministry of Health issued a new Act № 325 "On the development of cellular technology in the Russian Federation", which regulates the formation of a bank of umbilical cord and placental blood for research proposes; the separation and storage of placental blood concentrate; and the formation of a bank for stem cells derived from umbilical or placental blood. Meanwhile the legal framework for prenatal stem cells was still absent, clinics offered various fetal therapy programs and researchers patented fetal therapy technologies. For instance, a patent was issued in 1999 for a immunocorrective drug based on cell suspension, obtained from natal cryo-preserved hematopoietic fetal liver cells and/or human spleen; the drug is used as a patent method of treating diabetes[13].

A method was patented in 2000 for donor cell preparation from fetal tissue of aborted fetuses at the 17-21 weeks of fetal development[14]. The scientific community and media actively discussed the usage issues of cells with dubious origin. In particular, in 2004 there was a round table discussion at the Sechenov Moscow Medical Academy about the legal aspects of stem cell usage, the discussions were widely discussed in the Russian media[15]. The legal practice of licensing was only introduced in 2007 by the decree of January 22, № 30 "On the regulation of medical activity licensing", as a result of this document each organisation had to be licenced to

[11] V USA protivniki izuchenia embrionalnyh stvolovyh kletok snova obratilis v sud // Source: medical info website «Mednovosti»URL from 12.10.2012 <http://medportal.ru/mednovosti/news/2012/10/12/stophesc/>

[12] The ExploreStemCells website // URL <http://www.eurostemcell.org>

[13] Pat. 2126260 RU, MPK A61K035/28 A61K035/407 A61K035/48 A61K035/54. Lekarstvennyj preparat immunokorregirujushhego dejstvia na osnove kletochnoj suspenzii i sposob lechenija saharnogo diabeta s ispolzovaniem etogo preparata. URL <http://www.findpatent.ru/patent/212/2126260.html>

[14] Pat. 2160112, RU, MPK A61K35/48. Sposob prigotovlenija kletochnogo transplantata iz fetalnyh tkanej. Dismissed from 27.04.2012 URL <http://www.findpatent.ru/patent/216/2160112.html>

[15] Osnovnye rezultaty «kruglogo stola» v MMA im. Sechenova 23.11.2004, posvjashhennogo zakonodatelnym aspektam ispolzovanija stvolovyh kletok URL from 15.12.2011 http://www.mma.ru/events/44638/

work with cell technologies (including sampling, transporting and storage of hematopoietic stem cells, and the use of cellular technology). The need for a specialized legal framework has been put on the agenda at the end of 2009.

In January 2013 the Russian Ministry of Health published a draft law "On the circulation of biomedical cell products," which has not been approved yet. In Article 3 Section 11 it legislates the “inadmissibility of using cell products for the development, production and application if the biomedical material was derived by the interruption or disruption of the development of a human embryo or fetus." Thus, this new law could remove the most problematic ethic challenge of human stem cell research by prohibiting the main reason for the stem-cell therapy criticism.

Moreover, the law draft questions the legitimacy of the technologies which have already been patented in Russia. Medical experts are particular critical of the ban on working with embryonic and fetal stem cells. In the publications about this draft law[16], they have expressed a concern that this ban will set Russian science back, in comparison with other countries. In particular, they appeal to examples of research aimed to develop fetal and embryonic stem cell technology for the treatment of central nervous system injuries. They note that currently there is very little medical practice with technologies using live human cells"[17].

In addition to the above-mentioned conflict between morality, science, law and society about stem cell usage, there are other issues in the public discourse[18]. Currently, stem cell potential has just started to be used in science: there is no experimental data on which of the transplanted cells settle, and which do not, why they settle and how to explain the obtained effects. At this stage, only a few methods have become routine, such as bone marrow transplantation, used since 1980s as a treatment for certain cancers and hematological diseases. In Russia and other countries the majority of stem cell technologies are at the development stage (or in the most advanced cases in limited clinical trials), but it is a permanent topic in the media. In this case, the stem cells have long had become a kind of brand because of the active popularisation. Stem cell therapy has long been a popular innovative medical treatment offered in medical clinics (including plastic surgery clinics), based on the usage of animal stem cells. For example, a patent was issued in 2006 for a method of treating chronic and acute renal failure with fetal stem and progenitor cells[19]. This patent states that the human material is not used. Health and beauty clinics offer bioproducts for stem cell stimulation, or products with animal or plant stem cells or stem cell extract. Note that in article 6 of the above-mentioned draft law “the use of animal and plant cells for the preparation of cell lines to be used for the production of biomedical cellular products is not allowed”.

[16] Dobrjuha A. Rossian budut legalno lechit stvolovymi kletkami // URL from 19.03.2013

[17] Papernaja G., Moshkin M. Cerkov zashhitit zarodyshej ot nauki // URL from 19.02.2013 <http://mn.ru/society_faith/20120219/311867120.html>

[18] Akopjan A.S., Belousov D.Ju., Rysuly M.R., Kulikov A.V. Nekotorye aktualnye problemy klinicheskih issledovanij stvolovyh kletok // Kachestvennaja klinicheskaja praktika. 2010 №1, p.24.

[19] Pat. 2409373, MPK A61K35/23 (2006.01) A61P13/12 (2006.01). Sposob lechenija hronicheskoj i ostroj pochechnoj nedostatochnosti s pomoshhju fetalnyh stvolovyh i progenitornyh kletok. URL <http://www.findpatent.ru/patent/237/2373942.html>

Thus, stem-cell therapy is operationalised in three types of discourse:

- ethical discourse,
- medical discourse,
- beauty discourse.

In all three discourses there are critics of stem cells and supporters. The ethical discourse primarily focuses on the conflict between medicine and values, while the two other discourses are focused on the efficacy and safety of stem cell therapy. In the second case, we discuss the problem of charlatans who have access to stem cell technology and abuse clients trust[20]. Stem cell discourse is included in the context of the social legitimation of stem cell therapy. We have described the ethical dilemmas of the main discourse areas, the lack of evidence and inadequate legal framework. Information about stem cells began to appear in the media from the mid the 1990s.

Let us examine the media coverage of stem cells more closely. Table 1 shows the changes in media coverage which included the words "stem cells" (in the press, on radio, on television and on the Internet) for the period from 1996 to 2012. The publications were selected by relevant keywords. As the table shows, the number of references to the stem cells grew with each passing year. In 2001 the increase was more than threefold. It doubled in 2004. In the beginning of 2005 the stem cells started to be talked about on TV. The stem cell news also appeared in radio broadcasts. However, since 2009 the frequency of stem cells reports has declined on television and radio. Despite the loss through these communication channels in 2010, the number of stem cells messages increased sharply due to the topic appearing more frequently on the Internet.

Table 1. Dynamics of stem cells publications in 1995-2012 (publications number by year)[21].

	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Print media	4	8	17	28	66	233	351	410	887	1180	942	926	924	993	973	896	1104
Internet resources					24	87	101	122	201	225	383	475	445	405	1082	1618	1918
News agencies							9	14	59	74	129	156	135	303	388	325	507
TV										111	110	94	131	50	47	47	60
Radio										54	31	15	33	18	16	3	
Other media							2	4	4	2	6	3	1	1	1	5	8
Total	**4**	**8**	**17**	**28**	**90**	**320**	**463**	**550**	**1151**	**1646**	**1601**	**1669**	**1669**	**1770**	**2507**	**2894**	**3597**

The vast majority of media stem cell coverage has an informative purpose only: to report of scientific achievements or Nobel Prizes for discoveries related to stem cells, however, critically oriented materials are also clearly visible in the media. Television is the main informational source about science and technology, 80% of the population received information of this sort from television (Indikatory nauki, 2011, p. 315). Other sources are much less popular: online sources 30%, newspapers 25%, magazines, radio 16%. 86% of the audience say they are interested in medical R&D. This preference indicator did not change significantly in 2006

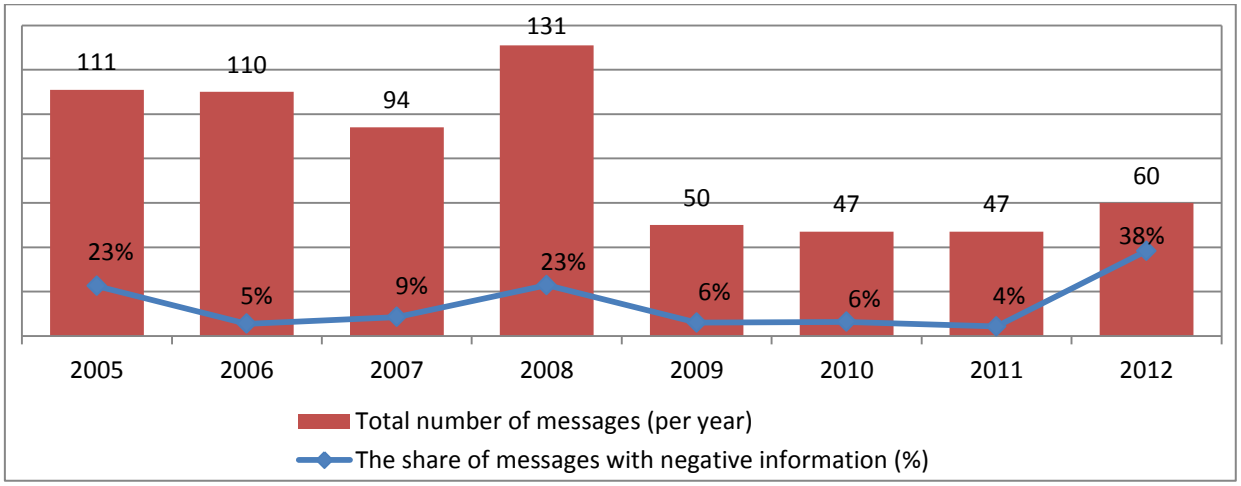
[20] Kuchuk A. Vrachi protiv Minzdrava: «Nelzja dobyvat stvolovye kletki iz jembrionov? A mozhet luchshe aborty zapretit?» // Source: Komsomolskaja pravda URL от 15.12.2010 <http://www.kp.ru/daily/24607/777885/>

[21] The number of massages about stem cells was calculated in online library of Russian-language Media «Public.Ru» by keywords “stem cells”.

(Indikatory nauki, 2013, p. 336). Therefore, medical information was interesting for the majority of TV audience. In this regard, it is important to analyse the critical stem cells information presented on television.

To determine the critical discourse on stem cells let us consider the results of a quantitative analysis of the critical TV reporting. For the period 2005-2012 15% of the TV stem cells items were critical. The distribution of this criticism is uneven. The highest percentage of critical materials was recorded in 2008 (Figure 1).

Figure 1. Dynamics of critical reporting about stem cells on television in 2005-2012 (% of total stem cells content on TV per year)[22].



At first, the critical discourse focused on the ethical and safety issues of stem cell therapy (Table 2). In 2008, television broadcasts stressed the black market problem, the risks of uncontrolled industry development, considered the lack of social consensus on the usage of prenatal stem cells (embryonic and fetal), and the potential side effects of innovative techniques. In particular, a major information event was that of the Interior Ministry investigation into fraud in the production and sale of "Stvolamin"[23], a drug which was presented as cosmetic complex made with stem cells. In 2005, the focus was on treatment, then in 2008 the television broadcasts began to report about the stem cells market, its rules and institutional foundations. Subsequently, the attention on stem cells declined, particularly in 2012, the total number of reports (critical or not) was 2 or 2.5 times lower than in 2005 and 2008. However, the effect of critical discourse 2012 was greater due to the high density: almost two thirds of the reports on television contained critical information about the stem cell industry (Figure 1). This can be partly explained by "Nevyansk discovery": barrels with aborted human embryos were found dumped in the forest of Sverdlovsk region. The news speculated that the material could be used for stem cells production:

- *Interviewer: It is possible that this human material was used for illegal experiments?*

[22] The number of reports about stem cells was calculated using the online library of Russian-language Media «Public.Ru». The search was limited to TV programs. We selected reports with negative information about stem cells by the following words and phrases: charlatan, immoral, "to put on the spare parts", myth, panacea, barrels, Nevyansk, strong protest, cynicism, "babies for spare parts", ethical issues, falsification, falsify, rogues, unofficial, uncontrolled, legal vacuum, questionable, unsafe, mythology, para-medicine, illegal, dangerous, illegal, criminal, to provoke cancer, black market, abortion material. All publications were checked in order to exclude reports where the keywords do not refer to the stem cell industry. The selection of keywords is based on the results of the qualitative content analysis of publications containing criticisms.

[23] The name "**Stvol**amin" is associated with the Russian wording "stem" (**stvol**ovoi).

- *Anton Belyakov, a doctor, a member of Russian parliament: If it is not formaldehyde, but certain other fluids that allow the extracting of stem cells, bone marrow or any tissues from abortional material then it is certainly a criminal offense ("24 " - newscast Ren TV, 23.07.2012).*
- *Interviewer: According to the inscriptions on the tags, some of the embryos were stored for several years. The investigation will show where and why they were thrown out as normal waste. The rumors are that the embryos were used to sample stem cells or to sell to the East, where the embryonic tissues are considered as "magical". Doctor Natalia Podolina does not exclude that someone tried to sample stem cells from unborn babies*
- *Natalia Podolina, an obstetrician-gynecologist: I know the GEMABANK (cord blood bank) uses them to treat different diseases or for rejuvenation, there is a very wide range of usage for these stem cells (NTV Today, 23.07.2012).*

Table 2. Key newsmakers of critical messages on TV in 2005, 2008, 2012[24].

	2005	2008	2012
Ethical problems of using embryonic and fetal stem cells	+	+	+
Side effects of stem cell therapy	+	+	
Ethical problems of hybrid embryos		+	
The black market for stem cells in Russia		+	+
Pseudo stem-cell cosmetics "Stvolamin"		+	
Falsification of research results			+

The content analysis of TV reports about stem cells shows that most of the messages did not contain criticism. The dominant themes are the therapeutic and medicinal possibilities of stem cells. Critical posts did not discredited stem-cell technology completely, but warned about problems in this industry. In fact, such reports contributed to the social legitimation of stem cell therapy: in particular, the correlation of the existing system of social values, the alignment of potential development, and the ideological formation of the distribution of social roles in the industry. Moreover, the discussion of the ethical usage of prenatal sources of human stem cells raised the question about the limits of biomedical expertise and the social willingness to accept such technologies. This discussion stressed the revision of the concept of human identity, the boundaries between a biological material and a human being. Let us proceed to the analysis of public opinion about stem-cell technology.

Public opinion about stem cells: expectations and concerns

By 2008 the topic of stem cells had already become widespread in the media. In 2008, the Public Opinion Foundation conducted a survey on the subject of public awareness about the latest achievements of modern medicine[25]. As already mentioned, about half of the respondents (52%) were aware of stem cells. The level of awareness about stem cells was higher in large cities (77% in Moscow and 63% in other metropolitan areas) and among respondents with higher education (78%). The majority of informed respondents were able to articulate exactly what they knew

[24] "+" means the presence of reports about stem cells on TV.
[25] The poll was conducted in 100 settlements of 46 regions, territories and republics of Russia. Home interview on 24-25 May 2008 1500 respondents. The statistical error does not exceed 3,6%. http://bd.fom.ru/report/cat/home_fam/healthca/d082124

about stem cells. Approximately half of the informed respondents remembered some information about the use of stem cells:

- treatment of diseases (11% in total sample),
- material for cloning and for growing organs and tissue ("*stem cells could be used for creating a new organism"; "they are used for cloning and for growing organs and tissues"* 8%),
- regeneration and rejuvenation ("*rejuvenating cells*"; "*they influence regeneration of the organism"* 7%) and use in cosmetology ("*used in rejuvenating creams*"; *"used in plastic surgery"* 1%).

Some respondents remembered different sources of stem cells (6%), called them universal cells which are the base for all the other kinds of cells (2%).

Quite a few respondents criticized the use of stem cells instead of answering the question ("*it is dangerous for humanity to work with stem cells"; "a scam in medicine", "it is prohibited method of treatment"* 1%).

Despite the substantial proportion of critical messages in media public opinion is generally neutral. Let us consider social attitudes towards specific technologies based on stem cells. Here we will try to indirectly assess the impact of media discourse on the social legitimation of socially sensitive medical biotechnologies.

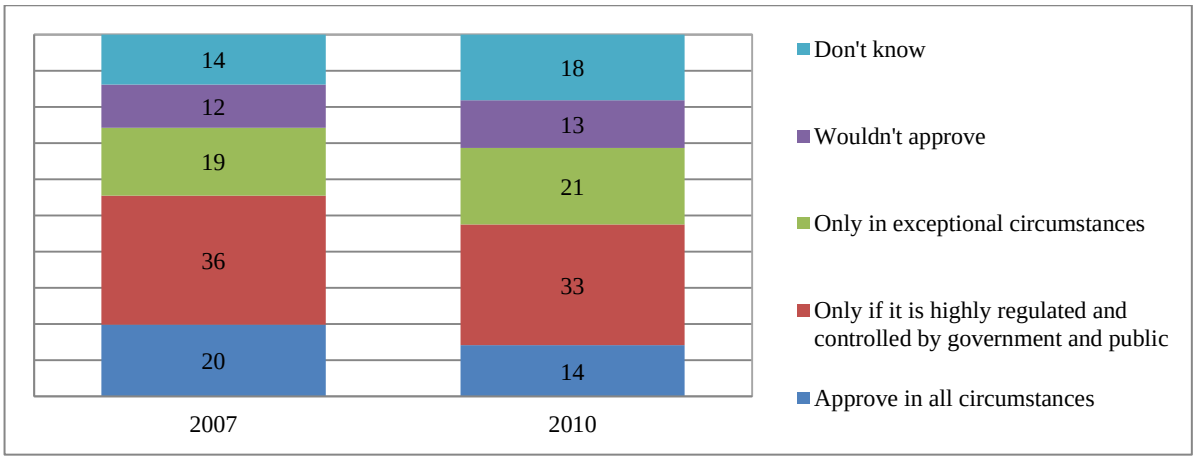
From the point of view of the population stem cell technology is one of the priority areas in medicine. According to an ISSEK survey of social attitudes to innovation conducted in 2010 75% of Russians noted the importance of scientific discoveries and new treatments for common diseases with the patient's own stem cells. In another poll conducted by the Levada Center in 2012, respondents were asked about the moral aspects of various technologies, including medical experiments with the stem cells of human embryos. In particular they were asked about the moral acceptability of stem cell research[26]. More than a third (39%) of respondents called such experiments immoral. 20% held the opposite opinion. 11% of respondents said that medical experiments with stem cells are not a moral issue, and 7% said "it depends on the circumstances". Nearly a quarter (23%) suspended judgment. The majority of respondents (61% in total) did not stigmatize the medical experiments with stem cells of human embryos.

Public opinion about embryonic stem cells was also studied in the ISSEK survey. Respondents were asked to comment on different technologies, including the cloning human of stem cells from embryos to make cells and organs that can be transplanted into people with diseases. Altogether 68% of respondents approved of it to varying degrees, 13% did not support it and 18% said they don't know. One out of three (33%) respondents would approve the cloning of human stem cells from embryos only if it was highly regulated and controlled. At least one out of five (21%) respondents would support it only in exceptional circumstances. 14% would approve in any circumstances. The total share of supporters slightly decreased from 2007 (74%)

[26] Press-release of Levada Center from 14.09.2012. http://www.levada.ru/14-09-2012/otkaz-ot-svoikh-detei-samoubiistvo-i-gomoseksualizm-moralno-nepriemlemo-dlya-bolshei-chas The poll was conducted August 10-13, 2012 using an All-Russian representative sample of urban and rural population of 1601 people aged 18 years and older in 130 localities from 45 regions of the country. The distribution of answers given as a percentage of the total number of respondents, the statistical error of the data from these studies did not exceed 3.4%.

to 2010 (68%). Possibly previous supporters chose their view under the influence of the ethical debate. For instance, the share of supporters in all circumstances decreased and the share of those who didn't know increased (see Figure 2).

Figure 2. The attitudes of the population to the cloning of human stem cells from embryos to make cells and organs that can be transplanted into people with diseases (%)[27].



Notably that the attitudes to the cloning of stem cells from embryos are partly correlated with age: among young people aged 18-24 years 82% more or less approved it, among respondents aged 65-74 years only 53% approved of it. Nevertheless the proportions of the answers in each of the age groups are the same as that in the whole sample. Even the young population tended to support the external control of the activities of scientists and physicians in cases of socially sensitive technologies. Consequently, social attitudes to the limitation of the powers of scientists and physicians in the case of socially sensitive technology is constant.

In other ISSEK polls conducted in 2003, 2006, 2009 and 2011 respondents were also asked about this technology, but in a different formulation of the question: "Have you ever heard anything about cloning? Is it acceptable, in your opinion, to clone people and/or human tissues?" (see table 3). In these surveys the share of respondents who allow cloning human tissues was almost half, although this formulation did not clarify the institutional conditions for the use of cloning. Cloning technology is socially stigmatized; according to a poll of Levada Center in 2012, more than half (58%) of Russian population said that human cloning is morally unacceptable[28].

The comparison of the four surveys conducted during this period, indicate a liberalization of social attitudes towards cloning. From 2003 to 2011 the share of respondents accepting the cloning of humans or human tissues gradually increased from 38% to 52% (see table 3). It is possible to highlight two periods of the growth, from 2003 to 2006 and from 2006 to 2009. In the first, the share of respondents who approve human cloning when a couple cannot have children naturally increased from 8% to 14%. In the second case (from 2006 to 2009) the share of the population supporting cloning the of healthy tissues for the treatment of diseased organs

[27] Answers to the question: "Would you approve the use of possible future applications of science and technology"?

[28] Press release of Levada Center from 14.09.2012. http://www.levada.ru/14-09-2012/otkaz-ot-svoikh-detei-samoubiistvo-i-gomoseksualizm-moralno-nepriemlemo-dlya-bolshei-chas The poll was conducted in August 10-13, 2012 at the all Russia representative sample of urban and rural population of 1601 people aged 18 years and older in 130 localities from 45 regions of the country. The distribution of answers given as a percentage of the total number of respondents, the statistical error of the data does not exceed 3.4%.

increased: from 30% to 37%. Cloning is not yet a socially approved biotechnology. However, the concept of cloning meets less rejection in the context of human suffering.

Table 3. The changes in social attitudes to human cloning from 2003 to 2009.

	2003	2006	2009	2011
Accept cloning people/human	**38**	**42**	**49**	**52**
… without restriction	3	2	3	3
… if family cannot have a child naturally	8	**14**	**12**	**16**
… only when cloning unaffected tissues is used as a substitute in affected human organs	27	30	**37**	**38**
Is unacceptable	41	37	38	34
Have heard nothing about cloning	9	11	6	8
Don't know	12	11	8	5

This comparative analysis of various surveys does not conclude that Russian population reject the use of embryonic stem cells outright. At the same time, the population is not ready to allow uncontrolled usage of human embryonic stem cells. The discussion around this biotechnology has contributed to the need for participation in the decision-making about new biomedical technologies. Further development of biomedicine requires more interaction between science and society that goes beyond the classical "deficit model", where population is a passive recipient of scientific information (Durant et al., 1992, pp. 162-163). To show this we consider the social attitudes in Russia to the freedom of scientific research.

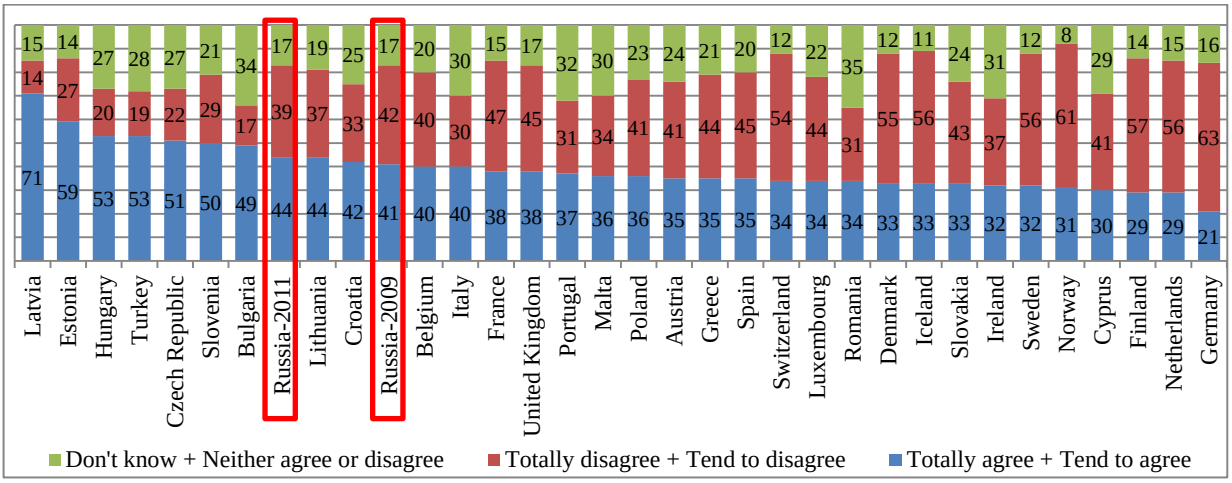
To find out the relationship to the freedom of decision-making in science, as well as to the uncertainty of the effects of scientific research, respondents were asked to rate their degree of agreement with the following statements:

- "Science should have no limits to what it is able to investigate." (Figure 3);
- "If a new technology poses risks that are uncertain and not yet fully understood, the development of this technology should be stopped even if benefits are expected." (Figure 4).

Answers to the questions in Russia were also compared with 32 European countries. Consider the responses to each question. Answers to the first statement shows that there is no unanimity about the freedom of scientific research among Russians. The proportion of supporters of scientific research restrictions and supporters of scientific research autonomy differ only by a small margin (39% and 44%, respectively). Russian attitudes are similar to the eastern and southern European countries.

The comparison to the response, the distribution in 2009 and 2011 indicates a liberalization in public opinion in Russia about restrictions to scientific research. In 2009 the share of scientific research autonomy supporters and scientific research restrictions supporters were about the same (41% and 42%, respectively), and in 2011 the balance changed in favor of absolute freedom for scientific research (44% and 39%).

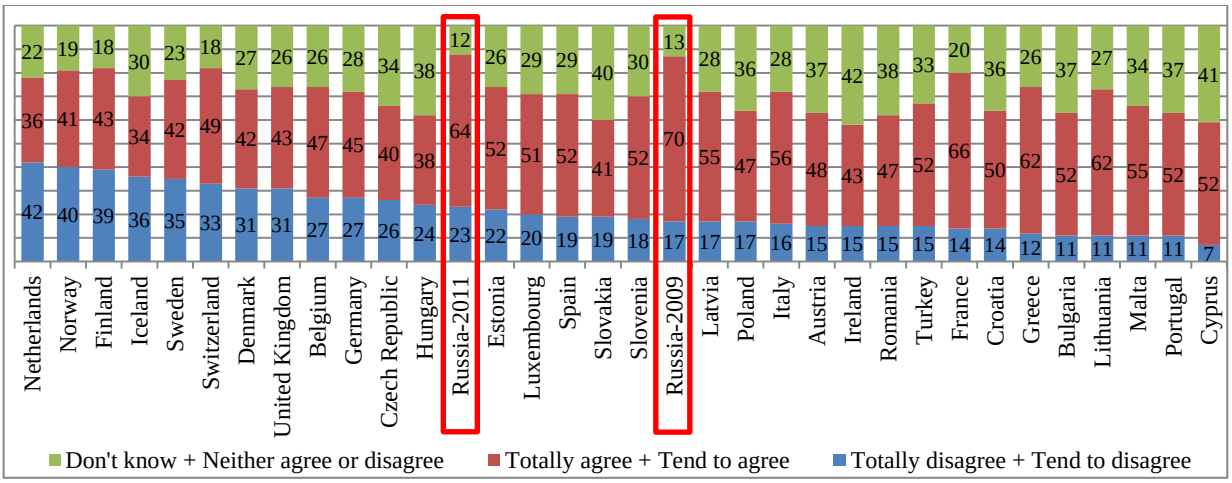
Figure 3. How much do you agree with following statement: "Science should have no limits to what it is able to investigate"?



Sources: ISSEK HSE; Eurobarometer 340, 2010.

It would seem that Russians are more open to the autonomy of science, however, the distribution of responses to the second question shows that public opinion about restrictions of scientific research changes dramatically in the event of a threat. Consequently, the understanding of the risks of new technology influences public opinion. The danger and uncertainty of the scientific outcomes reduces the value of positive results. The share of the ban supporters increased by more than half: from 39% to 64% (see Figure 4). In terms of research autonomy opposition without specifying the risk, the prevalence of the opposition is much higher than in a neutral context. This indicates a greater sensitivity in the population to risk rather than to potential benefits. In the countries of northern and western Europe, the share of scientific research autonomy (without specifying the risk context) was significantly lower than in Russia. In the case of the second statement (the risk context) the share of the ban supporters is much lower (for example, in the UK 45 % vs. 43%, Germany 63%, compared to 45% in Norway, 61% vs. 41%). In addition, in Russia the share of non-committal answers is significantly less than in other countries. We assume that population of these countries perceive the potential risks of the new technology as a stimulus to public debate about the problem and social expertise. Possibly at the level of values, Russians oppose a ban on research in connection with the social memory of the persecution of scientists. However, the absence of a sustainable model of civic participation and dialogue between science and society in Russia, along with the risk leads to a change of position, as described above.

Figure 4. How much do you agree with following statement: "If a new technology poses risks that are uncertain and not yet fully understood, the development of this technology should be stopped even if benefits are expected"?



Sources: ISSEK HSE; Eurobarometer 340, 2010.

Such social attitudes also appear in other surveys. For example, a study of Russian organizational culture indicates a tendency to avoid uncertainty (Danilova, Tararuhina, 2003; Naumov, 1996). This is considered as the perception of the degree of uncertainty in a situation as a threat, and resistance to the new and the unknown (Hofstede G., Hofstede GJ., 2005).

However, the number of opponents of scientific research restrictions in the case of uncertainty increased slightly from 2009 to 2011: from 17% to 23% (see Figure 4). Such a shift could be an indicator of the growth of confidence in scientists. However, in our opinion, there is another reason for this phenomenon. Research into the public understanding of science and interaction between the public and science point to a strengthening of critical attitudes toward science. People idealize scientists less, which corresponds to the trends described in international studies (e.g., Bauer., 2009). Polls of WCIOM show that although the overall level of institutional trust in science is quite high, from 2010 to 2012 the share of Russians who trust scientists, slightly decreased (from 71% to 66%)[29]. In this regard, the growth of the opposition to restrictions to risky scientific research shows that the tolerance for uncertainty in science and for the ambiguity of new technologies is forming among the population. Particularly, the tolerance for risk in science is positively correlated with the adoption of socially sensitive technologies. For example, according to the figures of 2011 in Russia 45% of opponents of restrictions to risky scientific research accepted cloning human tissues for transplant in any affected human organs, while among the supporters of such bans this share was 9 percentage points lower. We can suggest that the tolerance for risk in science indicates less the assumption of permissiveness, but rather the willingness to debate and make decisions based on the estimation of potential benefits and risks. Such a conclusion needs further detailed study focusing on the analysis of public understanding of the benefits and risks of socially sensitive biotechnology.

[29] «Uchitel, vrach, svjashhennik... Komu doveraut rossijane?» Press release of WCIOM №2082 from 06.08.2012 http://wciom.ru/index.php?id=459&uid=112942 The initiative Russian opinion poll was conducted on 9-10 June 2012, interviewed 1600 people aged 18 and older in 138 sampling points in 46 regions of Russia. The statistical error does not exceed 3,4%. This sample is comparable to the sample survey carried out by the Levada Center, whose data are used in this article.

Discussion

In this research, we have analyzed the social legitimation of stem cell technologies. We have studied different dimensions where we can observe challenges caused by the development of stem cells technologies in fields of science and medicine, morality and social values, and law. From the analysis presented in the previous sections, we deduce two important implications.

First, the study of the legal development shows an expansion of ethical expertise in the field of science and medicine. Moreover, this process has legal support. This indicates a cultural opposition to possible social changes caused by the development of socially sensitive technologies.

Second, despite this moral conflict there is not enough evidence to assert that the lay public consider stem cell technologies only in the light of the same moral categories, and opposes it. The same conclusion was reached in a broad survey by Parry et al. (2012, p. 68). According to a survey conducted by Critchley, whose objective was to study the factors of trust in the research of embryonic stem cells, it was found that public support depends on their understanding of the benefits of such technologies (Critchley, 2008, p. 316).

Consequently, there is a latent contradiction between public opinion and the decision making process. However, the comparison of different findings shows a lack of understanding among lay public. The primary limitation of all of these surveys is that they do not show how well respondents understand the processes involved in stem cell research. As we have shown the discourse about stem cells is complicated. The media provide different information about this industry which also, probably, has an influence on public opinion about medicine and science as a whole. Nevertheless many relevant issues were not included in these surveys.

Nevertheless, our findings need to be clarified with further specialized research. In the previous section it was shown that the description of technology and the type of question have an influence on the perception of the same technology. This can be an indicator of a lack of understanding of the technology. The results of foreign studies show that the population lacks information about the specifics of stem cell therapy (see, e.g.: Parry et al., 2012, p. 69). In this context, it is necessary to examine the lay understanding of socially sensitive innovation and the risks associated with them. Such studies in Russia are rare. The existing surveys do not show how well people understand the details of socially sensitive biomedical technology. As a result there is not enough data to understand social trends and changes in values related to biomedicine. Studies on the social aspects of biomedicine in Russia, are mainly focused on the analysis of its social consequences from the perspective of bioethics and redefining human identity (eg., Panfilov, 2008; Siluyanova, 2009; Naydysh, Gnatik, 2009, Yudin, 2008, 2011; Saritas, 2013). This field is closer to similar questions in studies of human-computer interaction (e.g., Akhmetov, 2013). It could be called the human-medicine interaction. However, lay interpretations are beyond the scope of surveys, while public opinion is also an important element in the development of regulations and the development of innovative industries.

Conclusion

The social legitimation of stem cell research occurs in the interaction of positive and critical discourse, as a result of the expansion of medical discourse in the field of social values. This

polarization is observed in the media, in political discussions and in public opinion surveys. The development of policy on stem cell research and regulation is based on the critical discourse. Particularly, the bill for legal regulation of the treatment of biomedical products bans the use of human embryos and aborted fetuses as sources of stem cells. Sources which are considered by many to be inappropriate, and which caused debate in the media about the permissibility of using such technology. A comparative analysis of different surveys shows that the population is wary of this technology. Despite the moral condemnation we cannot conclude that population does not accept the use of human embryonic stem cells outright. Furthermore, the analysis of the dynamics of the responses to the question of freedom of scientific research has revealed an upward trend of tolerance in relation to the possible risks of the development of science. As a result, the cultural conflict is not an obstacle to the recognition of stem cell research and its legitimation in the public consciousness. Rather the problematization of the technology affected the social assessment of the conditions for stem cell research, and contributes to the formation of attitudes to the control by the government and the public. The comparison of discourses on stem cells shows that the legislation ultimately proved to be more radical than might have been expected by the Russian population.

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